ABSTRACT

A microwave is radiated into a processing chamber (1) from a planar antenna member of an antenna (7) through a dielectric plate (6). With this, a C_5F_8 gas supplied into the processing chamber (1) from a gas supply member (3) is changed (activated) into a plasma so as to form a fluorine-containing carbon film of a certain thickness on a semiconductor wafer (W). Each time a film forming process of forming a film on one wafer is carried out, a cleaning process and a pre-coating process are carried out. In the cleaning process, the inside of the processing chamber is cleaned with a plasma of an oxygen gas and a hydrogen gas. In the pre-coating process, the C_5F_8 gas is changed into a plasma, and a pre-coat film of fluorine-containing carbon thinner than the fluorine-containing carbon film formed in the film forming process is formed.